CLAIMS

I claim:

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1. An imaging system to capture an accurate color image of a scene when illuminated by light, comprising in optical series

a tunable filter tunable between a first state wherein light transmitted by the filter has a first spectrum and a second state wherein light transmitted by the filter has a second spectrum different from the first spectrum; and

a color detector that captures an image of the scene by recording the light transmitted through the filter when the filter is in the first state, and then recording the light transmitted through the filter when the filter is in the second state.

2. The imaging system of claim 1 wherein in one of the first and second states the tunable filter transmits incident light of all wavelengths to a substantially equal degree.

3. The imaging system of claim 1 wherein in both the first and second states of the tunable filter at least some of the incident light is spectrally-filtered.

4. The imaging system of claim 3 wherein the first and second states of the tunable filter transmit colors that are substantially complementary to each other.

5. The imaging system of claim 1 wherein the tunable filter comprises a nematic liquid crystal cell.

6. The imaging system of claim 1 wherein the tunable filter comprises a flat-field variable retardance cell.

7. The imaging system of claim 1 wherein the tunable filter comprises an ECB type cell.

8. The imaging system of claim 1 wherein the tunable filter comprises a ferroelectric liquid crystal cell.

9. The imaging system of claim 1 wherein the color detector is a CMOS detector.

10. The imaging system of claim 1 wherein the color detector captures a two-dimensional image of the scene.

11. The imaging system of claim 1 wherein the color detector is selected from the group consisting of a mosaic-type detector, an assembly of a trichroic prism and three detectors, and a tricolor linear detector.

12. The imaging system of claim 1 wherein the color detector has a spectral response that is dependent on the bias voltage applied to the detector.

13. The imaging system of claim 1 wherein the tunable filter is disposed between the light that illuminates the scene and the scene whereby the tunable filter is filtering the light that illuminates the scene.

14. The imaging system of claim 1 wherein the tunable filter is disposed between the scene and the detector whereby the tunable filter is filtering the light received from the scene.

15. An endoscopic system to capture an accurate color image of a scene when illuminated by light, comprising in optical series

a tunable filter tunable between a first state wherein light transmitted by the filter has a first spectrum and a second state wherein light transmitted by the filter has a second spectrum different from the first spectrum; and

a color detector that captures an image of the scene by recording the light transmitted through the filter when the tunable filter is in the first state, and then recording the light transmitted through the filter when the tunable filter is in the second state.

16. The endoscopic system of claim 15 wherein the first and second states of the tunable filter transmit colors that are substantially complementary to each other.

17. The imaging system of claim 15 wherein in one of the first and second states the tunable filter transmits incident light of all wavelengths to a substantially equal degree.

18. An endoscopic system to capture an accurate color image of a scene when illuminated by light, comprising in optical series

a filter wheel capable of switching between a first filter wherein light transmitted by the first filter has a first spectrum and a second filter wherein light transmitted by the second filter has a second spectrum; and

a color detector that captures an image of the scene by recording the light transmitted by the first filter, and then recording the light transmitted by the second filter.

19. The endoscopic system of claim 18 wherein the first and second states of the first and second filters transmit colors that are substantially complementary to each other.

20. The endoscopic system of claim 18 wherein in one of the first and second filters transmits incident light of all wavelengths to a substantially equal degree or transmits all incident light.

21. A method to capture an accurate color image of a scene when illuminated by light, comprising

passing the image through a tunable filter tunable between a first state wherein light transmitted by the filter has a first spectrum and a second state wherein light transmitted by the filter has a second spectrum different from the first spectrum; and

recording the light transmitted through the filter with a color sensor when the tunable filter is in the first state, and then recording the light transmitted through the filter with the color sensor when the tunable filter is in the second state.

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22. A method to capture an accurate color image of a scene when illuminated by light, comprising

passing the light that illuminates the scene through a tunable filter tunable between a first state wherein light transmitted by the filter has a first spectrum and a second state wherein light transmitted by the filter has a second spectrum different from the first spectrum; and

recording the light received from the scene with a color sensor when the tunable filter is in the first state, and then recording the light received from the scene with the color sensor when the tunable filter is in the second state.

23. The imaging system of claim 1 wherein the tunable filter is a switchable optical birefringent filter responsive to incident light in a polarization state comprising:

a first optical retarder having an optical axis and a first action on the polarization state of incident light passing through the first retarder;

a second optical retarder disposed in optical series with said first retarder for receiving light that has passed through the first retarder and having an optical axis and a second action on the polarization state of the received light passing through the second retarder; and

a switch disposed between the first optical retarder and the second optical retarder operable for varying the filter response between a first operating state in which the filter transmits without significant alteration to the polarization state substantially all of the incident light within a predetermined range of wavelengths and a second operating state in which the filter produces a predetermined spectral variation of the incident light in its passing through the filter by changing the polarization state of the light received by the second retarder.

24. The imaging system of claim 1 wherein the color at each point of the image is calculated by recording the signal levels at that point in each image, as obtained with the tunable filter in each of the first and second states, and combining the signal levels in predetermined proportions to produce the final color value for that point.

25. The endoscopic system of claim 15 wherein the color at each point of the image is calculated by recording the signal levels at that point in each image, as obtained with the tunable filter in each of the first and second states, and combining the signal levels in predetermined proportions to produce the final color value for that point.

26. The endoscopic system of claim 18 wherein the color at each point of the image is calculated by recording the signal levels at that point in each image, as obtained with

each of the first and second filters, and combining the signal levels in predetermined proportions to produce the final color value for that point.

27. The method of claim 21 wherein the color at each point of the image is calculated by recording the signal levels at that point in each image, as obtained with the tunable filter in each of the first and second states, and combining the signal levels in predetermined proportions to produce the final color value for that point.

28. The method of claim 22 wherein the color at each point of the image is calculated by recording the signal levels at that point in each image, as obtained with the tunable filter in each of the first and second states, and combining the signal levels in predetermined proportions to produce the final color value for that point.

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